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FLAGSTONE INDUSTRY IN NORTHEASTERN PENNSYLVANIA

By

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Introduction.

Quarrying flagstone for sidewalks once was a flourishing industry in northeastern Pennsylvania but portland cement has virtually cornered the market in sidewalk material. Where once the flagstone quarries employed nearly 1000 men there are now less than 50 quarrymen and most of these are doing a very small and desultory business.

In the summer of 1922 the writer made a rapid reconnaissance through northern Pennsylvania and visited several of the quarries that are still being worked. An idea that the flagstone industry has some chance of recovering part of its lost business prompts this paper.

Definition.

Flagstone is variously described as "a rock that splits readily into slabs suitable for flagging;" "a sandstone naturally separating into layers of suitable thickness for flagging; usually the layers are parallel to the bedding or stratification of the rock; but there are cases in which the lamination of the material available for flagging is the result of cleavage or jointing;" "a flat rock used in paving, or any rock which will split into such stones."

Flagstone produced in southeastern New York and northeastern Pennsylvania is also known as bluestone. Bluestone is the commercial name for a dark bluish-gray feldspathic sandstone or arkose. The color is due to the presence of fine black and dark-green minerals, chiefly hornblende and chlorite. The toughness of the rock, due to



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slight metamorphism, and the ease with which it may be split into thin slabs especially adapt it for use as flagstone.

Uses.

Bluestone is used as general building stone, for flagging and curbing, and as trimming for buildings, such as sills, lintels, steps, and base courses. Concrete is used extensively as a substitute for stone for these purposes. The use of crushed bluestone for railroad ballast is increasing.

This paper deals only with the use of bluestone as flagging and curbing, and kindred uses, such as burial vaults, cistern, cess pool, and well covers. By far the largest use of flagging is for sidewalks. Flagstones vary greatly in size; the commonest size is about four feet square and two inches thick. The largest stone seen by the writer last summer is at 514 Church Street, Honesdale, and measures 22' 3" by 7' 11" by 4". Several flagstones 10' by 15' by 4" have been quarried in Pike County for use in New York City, and one flag 25' by 15' by 8" was quarried across Delaware River from Shohola.

Age and location.

The flagstones of northeastern Pennsylvania are of Devonian age. The Devonian rocks for the most part lie nearly horizontal and the main exposures are along the bluffs of the main streams. The flagstone quarries are at various horizons in the lower part of the Catskill and upper part of the Chemung formations. These horizons are exposed in a belt from Lehigh River northeast across Carbon, Monroe, and Pike counties to the Delaware near Millrift and up the Delaware along the boundary of Pike and Wayne counties. The same horizons are exposed also along the Susquehanna near Lanesboro close to the New York boundary, and on the same river in Wyoming County above Meshoppen.

Development and decline of flagstone industry.

Some of the Devonian sandstones where long exposed to rain and frost split easily along bedding planes into slabs from 2 to 8 inches thick and in lengths ranging from 2 to 20 feet, according to the space between natural joints. This feature was early recognized by the settlers and the stone was quarried for buildings, walks, and fences.

The date when flagstones were first raised in Pennsylvania probably could not be determined but doubtless flag walks were laid in some of the settlements at least 75 and perhaps 100 years ago. For many years quarrying was done only by farmers in their spare time, but eventually it became a regular industry for certain individuals. At the peak of development about 200 different quarries were in operation, 50 of them in Wayne, 40 in Susquehanna, and 35 in Pike counties. Wyoming and Lycoming counties had about 25 quarries each.

As the principal use for flagstone is for sidewalks, the demand increased as the population of the northeastern counties grew. The production of curbing was a somewhat later development and utilized some of the thicker flags. The climax of the flagging and curbing industry was in 1906 when the value of the output exceeded \$435,000. From that year production decreased almost regularly to about \$27,000 in 1918.

The decline of the industry is ascribed by the quarrymen to the increasing use of portland cement for making concrete walks. The abrupt decline from 1916 to 1918 may be assigned in part to high freight rates and to high wages.

The value of the annual output is shown in the following table which has been compiled from Mineral Resources of the United States, published by the United States Geological Survey.

Value of flagging and curbing produced in Pennsylvania

Year	Flagging	Curbing	Total Value
	\$	\$	\$
1902	92,469	69,556	162,025
1903	173,701	126,593	300,294
1904	216,251	149,491	365,742
1905	216,435	157,391	373,826
1906	265,481	170,103	435,584
1907	253,523	128,740	382,263
1908	217,690	116,197	333,887
1909	195,525	83,538	279,063
1910	107,846	98,553	206,404
1911	87,769	78,106	165,875
1912	95,223	116,647	211,870
1913	93,198	94,625	187,823
1914	48,239	67,590	115,829
1915	57,455	54,923	112,378
1916	41,729	43,415	85,144
1917	25,901	26,408	52,309
1918	17,097	9,894	26,991
1919	38,912	30,138	69,050
1920	20,145	31,199	51,344
	\$ 2,264,589	\$ 1,656,112	\$ 3,922,701

A total value of \$4,000,000 for a local mineral product in 20 years, or an average of \$200,000 per year, has been a material financial benefit to this corner of the State.

Notes on Quarries Visited.

During the summer of 1922 the writer in a reconnaissance of the eastern half of the State stopped for a few minutes at such quarries as came to his notice. Some of the larger quarries on Delaware River above Port Jervis are difficult of access from the Pennsylvania side and were not seen. Others that have long been producers are now idle and some are filled with water. Most of the quarries are high in the hills. This is because the flat-lying and weather-resisting sandstone forms the upland,

Pike County.

Dingmans Ferry. Four miles west of Dingmans Ferry and 900 feet above Delaware River are the Decker quarries which have been operated by Squire J. V. Hood since 1898. The bluestone strikes north, pitches slightly west, and is so massive a few feet back from the outcrop that stone is raised only where sufficiently weathered to part readily along the bedding planes. Consequently there are small openings along the outcrop instead of one large quarry. A single bed about 5 feet thick is the principal source of flagstone. Mr. Hood works single handed or with one assistant, and only intermittently as orders are received. Of late years the output has been mainly for burial vaults. The largest flag ever taken out here was 10 feet square. All work is by hand and only local demand is supplied, for lack of a railroad.

Lackawaxen. Messrs. Smith & Beisel are working a quarry at the point of the ridge between Delaware River and Lackawaxen Creek, about 160 feet above the railroad at Lackawaxen. The overburden is about 5 feet, the bedding is horizontal, and the stone parts in thin beds. Three men are employed and hand power only is used. The product is curbing and flagging for northern New Jersey, New York City, and Long Island. The stone is bluish-gray and not so dark as a sandstone formerly quarried on the bank of a run $\frac{1}{4}$ mile southwest of the Lackawaxen Station.

Flagstones now at the Delaware hotel, Lackawaxen, measuring 5 x 12 and 7 x 11 feet are from the nearby Kilgore quarry.

Abutments of the Delaware & Hudson canal aqueduct at Lackawaxen were built of local building stone. The canal was completed in 1828 and abandoned in 1899. Chiseled water gauge marks on these stones are plainly visible 90 years later, which is good evidence of durability.

Pond Eddy. Maxwell & Harding were reported to be employing 12 to 20 men and getting out a considerable quantity of stone at Pond Eddy. This place was difficult of access from the writer's route and was not visited. Pond Eddy has been one of the large producers of flagging and has found its principal market in New York, Brooklyn, and Newark.

Kimbles. A. H. Woodward & Son, of Newark, N. J. operate a

quarry $2\frac{1}{2}$ miles east of Kimbles near the top of a ridge and 450 feet higher than the railroad. The quarry face is about 350 feet long and 25-30 feet high. Horizontal bedding and practically no cover facilitate quarrying. Most of the output at present is curbing for New York City. Paving flags also are produced. Jackhammer drills operated by compressed air are used. A gas engine drives the compressor but the derricks are operated by horse whips. The quarry employs 7 men.

The Standard Bluestone quarry on top of the opposite hill was idle.

Wayne County.

Aldenville. John H. Bowen quarries flagstone on his farm 1 mile south of Aldenville. The stone lies flat, raises in thin lifts, is gray in color, and is marketed in Honesdale. Mr. Bowen works alone.

Susquehanna County.

Stevens Point. Several bluestone quarries have been opened on the ridges near Stevens Point. Richard Bailey is quarrying about $2\frac{1}{2}$ miles north of Stevens Point, and Frank Baker is operating near Baker. Both of these operators are producing a small quantity of flags and curbs for shipment by rail.

Lanesboro. A greenish-gray sandstone quarried in a hill nearby was used for building the high stone arch viaduct of the Erie Railroad across Starrucca valley at Lanesboro. The rock is fairly hard and its durability is evident from the present condition of the bridge. Messrs. Walters and Call are operating an old quarry up a hollow at the east end of town. Five men are employed getting out curbing and flagging, which is shipped to Binghamton, Scranton, and Philadelphia. The stone lies almost perfectly flat, and the bed being worked raises in heavy lifts, 6 to 8 inches thick. The color is light bluish-gray.

South Montrose. Wynans Brothers of South Montrose are working a quarry on the B. F. Jones farm. The bedding is flat and 25 feet of worthless stone must be moved to get at a bed of stone $14\frac{1}{2}$ feet thick which is suitable for flagging and curbing. Drilling is done by heavy-duty steam tripod drills, the quarry is kept dry by a steam-operated pump, and the derrick is operated by a gasoline hoist. The product goes mostly to Scranton, Wilkes-Barre, and Pittston.

Wyoming County.

Meshoppen. So far as the writer observed, the flagstone industry is more active in the northwest corner of Wyoming County than elsewhere. At Meshoppen the stone cutting plant of B. Ridgway & Son, Philadelphia, is handling the output of several quarries. Mr. John Gaul, superintendent of the plant, says that a shortage of stone cutters greatly curtails the output. Stone from the quarries near

Meshoppen is greenish gray, gray, bluish, and reddish. Ridgway and Son have furnished flagging for the floors in the newer and larger buildings of various eastern colleges, and the difference in color of the flags is utilized to make geometrical designs and enhance the beauty of these floors. Stones are cut to predetermined irregular shapes to break up the monotony of rectangular flags. There has long been a demand for sawed and planed surfaces but recently the rough natural surface is favored more and more.

Laceyville. Five quarries on a ridge west of Tuscorora Creek and north of Laceyville were being operated in 1922. Champlain Bros., Johnson Clapper, Cash Co., Holden & Champlain, and John Woodruff were reported to be the operators. The Cole quarry 1 3/4 miles west of Laceyville was employing five men raising flagstone from a thin bedded flat-lying stratum. Some of the other quarries in the neighborhood were one or two men operations.

Horace Ruger is employing several men in quarries near Standing Rock and Skinners Eddy and shipping flags and curbs by rail.

At Black Walnut is an abandoned bluestone quarry with a face about 900 feet long and 40 feet high. This is the largest quarry the writer saw in northeast Pennsylvania.

Future development.

To the writer it seems warranted to assume that the production of flagstone in northeastern Pennsylvania can be developed into a very considerable industry in comparison with its present condition. Twenty years ago, hundreds of men were engaged in quarrying. The stone remains in the hills but the demand now is light and few men find employment at the quarries. The development of the industry may require or be advanced by the organization and cooperation of the producers, and by an advertising campaign conducted and financed by the organization. Where flagstone can compete with concrete in price, the more attractive quality of the flagstone should give it preference. Furthermore, when cement pavements become "heaved," they are difficult to level. Flagstones are easily leveled, and single stones, if broken, can be matched in color and replaced without injury to the rest of the paving.

Aesthetic rather than practical consideration may build up the flagstone industry. There are many people who care more for the beautiful than for cost; who want their walks pretty rather than prim. This desire should be fostered by the quarrymen. Some college buildings recently completed have been floored with flagstone rather than with marble or concrete. Irregularly cut flagstones of different colors laid in patterns make a floor that both wears well and pleases the eye. The stone yard at Meshoppen has furnished such flagstone floors for college buildings at Brown, Cornell, Princeton, and Ann Arbor.

Illustrations in current monthly journals, like Country Life and House and Garden, show flagstones used for walks and pavement of

terraces or uncovered porches in private grounds. The stones are cut in irregular shapes so as to give a less formal effect than rectangular slabs, and are purposely laid detached so that grass may grow between them. The demand for such purposes may never be large but should be worth catering to.

The old-fashioned flag walk may again be in demand in the region contiguous to the quarries. The writer has recently seen broken concrete paving torn up to be replaced with flagstone, and believes that many town and city properties now building would use flagstones in preference to concrete for sidewalks if they could be purchased as easily and at nearly the same cost.

The market for flagstone will always be limited geographically to a circle of small radius centering at the quarries, for flagstones are expensive to ship and difficult to handle in comparison with sand and gravel and sacks of cement. However, if the market within reasonable shipping distance is cultivated by attractive advertising, the demand for flagstone should be much increased.

Producers.

The following producers reported their output of flagging and curbing for 1922 to the United States Geological Survey.

<u>Name and address</u>	<u>County</u>
J. Van Zant Hood, Dingmans Ferry	Pike
Olive Sartori, Kimble	"
A. H. Woodward & Co., Pond Eddy	"
J. H. Bowen, Prompton	Wayne
Charles Croft, Alford	Susquehanna
Alford Bluestone Co., Alford	"
Bailey Bros. Stevens Point	"
Richard Bailey " "	"
A. G. Spears " "	"
F. T. Winters Lanesboro	"
Horace Ruger, Laceyville	Wyoming
B. Ridgway & Sons Meshoppen	Wyoming

